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APPLICATION  
FOR  
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LETTERS PATENT

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# DISC BRAKE FOR VEHICLE

## BACKGROUND OF THE INVENTION

### 1. Field of the Invention

5           The present invention relates to a disc brake for a vehicle that is used in vehicles such as automobiles and motorcycles. More specifically, the invention relates to the structure of pad retainers that are set in pad guide grooves of caliper support arms and movably support ears of back plates of friction pads.

### 2. Description of the Related Art

10           In general, in conventional disc brakes in which friction pads are hung and held so as to be movable in the disc axial direction in such a manner that ears projecting from both side portions of back plates of the friction pads are movably supported  
15 by pad guide grooves that are formed in caliper support arms of a caliper bracket, pad retainers made of a metal thin plate are interposed between the pad guide grooves and the ears. Each pad retainer is formed with pad returning mechanisms that are brought in contact with the disc-rotor-entrance-side and  
20 exit-side side faces of the ears and urge the ears parallel with the disc axial direction away from the disc rotor. In a non-braking state, the pad returning mechanisms (pad springing-back portions) forcibly return the friction pads from the disc rotor, whereby dragging of the friction pads and juddering  
25 that is caused by wear of the disc rotor are prevented and brake

noise is reduced (refer to JP-UM-A-56-129624, for example).

However, with the above configuration in which the pad returning mechanisms urge the friction pads away from the disc rotor, in tentatively attaching the friction pads to the pad guide grooves of the caliper support arms, the friction pads are pushed away from the disc rotor and may fall off the caliper support arms. As a result, the attachment work takes much time.

Although as described above the pad retainers having the above structure have the effect of returning the friction pads from the disc rotor in a non-braking state, they cannot prevent the ears from playing in the disc radial direction inside the pad guide grooves. Further, since the friction pads are always urged away from the disc rotor by the pad springing-back portions, the friction pads are prone to fall off a caliper bracket in attaching the friction pads to the caliper bracket tentatively. The attachment work thus takes much time.

#### SUMMARY OF THE INVENTION

An object of the present invention is therefore to provide a disc brake for a vehicle capable of preventing friction pads from falling off a caliper bracket in tentatively attaching the friction pads to caliper support arms of the caliper bracket and thereby increasing the ease of attachment.

Another object of the present invention is therefore to provide a disc brake for a vehicle in which pad springing-back

portions are solely able to not only return friction pads but also effectively prevent play of ears to thereby reduce brake noise and suppress juddering caused by wear of a disc rotor and effectively prevent generation of a friction pad striking sound  
5 due to play of the ears and further the pad springing-back portions are solely able to prevent the friction pads from falling off a caliper bracket in attaching the friction pads to the caliper bracket tentatively to thereby allow the friction pads to be attached easily.

10 To attain the above object, the present invention provides a disc brake for a vehicle having: a caliper bracket fixed to a vehicle body; a pair of caliper support arms striding an outer periphery of a disc rotor in a disc axial direction; pad guide grooves formed in the caliper support arms so as to  
15 be opposed to each other; friction pads disposed on both sides of the disc rotor, the friction pads having ears projected from both side portions of a back plate thereof, and pad retainers disposed on the pad guide grooves, the ears of the friction pads being movably supported by the pad guide grooves via the pad  
20 retainers, wherein pad retainers each has pad returning portions for urging the friction pads away from the disc rotor.

The pad returning portions may include: an elastic loop portion formed by a long and narrow piece outwardly extended away from the disc rotor in the disc axial direction and bent  
25 back to the disc rotor in the disc axial direction; and a pad

springing-back portion formed by the long and narrow piece further extended toward the disc rotor and outwardly inclined in a disc radial direction.

5 The long and narrow piece of the elastic loop portion may be bent back so as to form a circular arc, and the long and narrow piece of the pad springing-back portion may be warped as a shape of a curvature.

10 The pad guide grooves may be formed by bracket-shaped grooves each having a disc radial direction outer side face, a disc radial direction inner side face, and an opposed face connecting the two side faces.

15 The pad retainer may include: a receiving piece contacted with the disc radial direction inner side face and a long and narrow piece extended from the receiving piece away from the disc rotor, a proximal portion of the long and narrow piece may be bent back toward the disc rotor in circular arc form to form an elastic loop portion, a tip portion of the long and narrow piece that extends from the elastic loop portion toward the disc rotor may be outwardly inclined in the disc radial direction to form a pad springing-back portion, and wherein the pad springing-back portion may be contacted with a disc radial direction inner side face of the ear to urge the ear away from the disc rotor and outward in the disc radial direction.

25 The pad springing-back portion may be warped as a shape of a curvature as it extends from the proximal portion.

The elastic loop portion may be located on an opposite side of the ear to the disc rotor.

The pad retainer may include pad falling-off preventive portions projected on opposite sides of the ears to the disc  
5 rotor.

The elastic loop portion may be a pad falling-off preventive portion.

#### BRIEF DESCRIPTION OF THE DRAWINGS

10 Fig. 1 is a sectional view taken along line I-I in Fig. 7;

Fig. 2 is a rear sectional view of an important part of a disc brake according to a first embodiment of the present invention;

15 Fig. 3 is a plan sectional view of an important part of the disc brake according to the first embodiment of the invention;

Fig. 4 is a perspective view of a pad retainer according to the first embodiment of the invention;

20 Fig. 5 is a partially sectional rear view of the disc brake according to the first embodiment of the invention;

Fig. 6 is a sectional view taken along line VI-VI in Fig. 7;

Fig. 7 is a front view of the disc brake according to  
25 the first embodiment of the invention;

Fig. 8 is a plan view of the disc brake according to the first embodiment of the invention.

Fig. 9 is a sectional view taken along line IX-IX in Fig. 14;

5            Fig. 10 is an enlarged sectional view of an important part of a disc brake according to a second embodiment of the present invention;

Fig. 11 is a perspective view of a pad retainer according to the embodiment of the invention;

10           Fig. 12 is a partially sectional rear view of the disc brake according to the embodiment of the invention;

Fig. 13 is a sectional view taken along line XIII-XIII in Fig. 14;

Fig. 14 is a front view of the disc brake according to  
15 the embodiment of the invention; and

Fig. 15 is a plan view of the disc brake according to the embodiment of the invention.

#### DETEILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

20            Embodiments of the present invention will be hereinafter described in detail with reference to the drawings. Figs. 1-8 shows a first embodiment in which the invention is applied to a pin-slide-type disc brake. A disc brake 1 is composed of a disc rotor 2 that is to rotate together with a wheel, a caliper  
25 bracket 3 to be fixed to a vehicle body on one side of the disc

rotor 2, a caliper body 5 that is supported by two caliper support arms 3a of the caliper bracket 3 via a pair of slide pins 4 so as to be movable in the disc axis direction, and a pair of friction pads 6 that are located inside an acting portion 5a and a reacting portion 5b of the caliper body 5 so as to be opposed to each other with the disc rotor 2 interposed in between.

The caliper body 5 is composed of the above-mentioned acting portion 5a and reacting portion 5b that are disposed on both sides of the disc rotor 2 and a bridge 5c that strides the outer periphery of the disc rotor 2 and connects the acting portion 5a and the reacting portion 5b. Two cylinder holes 7 are formed in the acting portion 5a so as to be opened on the disc rotor 2 side. A piston 8 that is shaped like a closed-end cylinder is housed in each cylinder hole 7, and each piston 8 is moved inside the cylinder hole 7 toward the disc rotor 2 by a pressurized fluid that is supplied to a fluid pressure room 9 that is formed at the bottom of the cylinder hole 7. Two vehicle body attachment arms 5d project sideways from the acting portion 5a, and the above-mentioned slide pins 4 are attached, by means of attachment bolts 10, to the tip portions of the vehicle body attachment arms 5d so as to project from the vehicle body attachment arms 5d, respectively.

The caliper support arms 3a are shaped so as to originate from positions on both sides of the caliper bracket 3, bridge the outer periphery of the disc rotor 2 in the disc axial direction



with the bridge 5c interposed in between, and extend toward the disc center parallel with the side wall of the reacting portion 5b on the other side of the disc rotor 2. The tip portions of the caliper support arms 3a are connected to each other by a tie rod 3b to increase the rigidity of the support arms 3a on which braking torque is exerted.

A guide hole 11 that houses the above-mentioned slide pin 4 is formed in each caliper support arm 3a, and a total of four pad guide grooves 3c are formed in the caliper support arms 3a on both sides of the disc rotor 2 so as to be opposed to each other. Each pad guide groove 3c has a bracket shape having an outer (in the disc radial direction) side face 3d, an inner side face 3e, and an opposed face 3f that connects the outer face 3d and the inner face 3e. Two ears 12a projecting from both side portions of a back plate 12 of each friction pad 6 are movably supported by two (i.e., disc-entrance-side and disc-exit side) pad guide grooves 3c via pad retainers 20, respectively.

Each of the disc-entrance-side and disc-exit-side pad retainers 20 has a pair of retainer portions 20a that are set in the pad guide grooves 3c located on both sides the disc rotor 2, two pad returning portions 20b (i.e., pad returning mechanisms of the invention) and pad falling-off preventive portions 20c that are continuous with the respective retainer portions 20a, a link 20d that strides the outer periphery of the disc rotor 2 and connects the tops of the retainer portions 20a, and an

attachment piece 20e that is locked with a rotor groove 3g of the caliper support arm 3a.

Each retainer portion 20a has an inner receiving piece 20f and an outer receiving piece 20g that are opposed to each other in a direction that is somewhat inclined from the disc radial direction with the ear 12a of the friction pad 6 interposed in between, and a side piece 20h that connects the pieces 20f and 20g.

On the opposite side of each side piece 20h to the disc rotor 2, a long and narrow piece extends outward in the disc axial direction from each side piece 20h and is bent back so as to assume a circular arc to form an elastic loop portion 20i. The long and narrow piece further extends toward the disc rotor 2 to form a pad springing-back portion 20j. The elastic loop portion 20i and the pad springing-back portion 20j constitute the above-mentioned pad returning portion 20b. Each pad springing-back portion 20j is longer than a distance by which the ear 12a of the friction pad 6 is moved from a time when a lining 13 is new to a time when it is fully worn. And each pad springing-back portion 20j is inclined, that is, warped, so as to go away gradually from the side piece 20h as it extends toward the disc rotor 2.

On the opposite side of each inner receiving piece 20f to the disc rotor 2, a long and narrow piece extends outward in the disc axial direction from each side piece 20h and is bent

back so as to assume a circular arc to form the pad falling-off preventive portion 20c. To facilitate insertion of the ear 12a of the friction pad 6, an insertion guide 20k is bent outward from each outer receiving piece 20g on the side opposite to the disc rotor 2.

The pad retainer 20 having the above structure is set in such a manner that the inner receiving piece 20f and the outer receiving piece 20g of each retainer portion 20a is brought in contact with the inner (in the disc radial direction) side face 3e and the outer side face 3d of the pad guide groove 3c, respectively, and the side piece 20h is placed on the opposed face 3f of the pad guide groove 3c. As for each friction pad 6, the ears 12a of the back plate 12 are inserted in the disc-entrance-side and disc-exit-side pad guide grooves 3c, respectively, an outer (in the disc radial direction) side face 12b and an inner side face 12c of each ear 12a are brought in contact with the outer receiving piece 20g and the inner receiving piece 20f of the retainer portion 20a, respectively, and two (i.e., disc-entrance-side and disc-exit side) end faces 12d of the ears 12a are brought in contact with the pad springing-back portions 20j, respectively. With the friction pads 6 thus attached, the elastic loop portions 20i and the pad falling-off preventive portions 20c are located on the opposite sides of the ears 12a to the disc rotor 2.

In this embodiment having the above configuration, when

each friction pad 6 is tentatively attached to the caliper support arms 3a of the caliper bracket 3, the pad falling-off preventive portions 20c project on the sides of the ears 12a opposite to the disc rotor 2. Therefore, even if the ears 12a that are in contact with the respective pad springing-back portions 20j are pushed away from the disc rotor 2, the pad falling-off preventive portions 20c contact the ends, opposite to the disc rotor 2, of the ears 12a and hence can prevent falling-off of the friction pad 6. The ease of attachment of each friction pad 6 can thus be increased. The elastic loop portions 20i that are located on the opposite sides of the ears 12a to the disc rotor 2 are effective in preventing, more reliably, the friction pad 6 from falling off the caliper support arms 3a. The caliper body 5 in which the pistons 8 are inserted is attached to the caliper bracket 3 to which the friction pads 6 are attached tentatively, and the disc rotor 2 is placed between the friction pads 6.

In the disc brake 1, when a pressurized operating fluid is supplied to the fluid pressure rooms 9 in response to a braking manipulation of the driver, the pistons 8 advance in the cylinder holes 7 and press the acting-portion-5a-side friction pad 6 against the one side surface of the disc rotor 2 that is rotating in the direction A. Resulting reaction force causes the caliper body 5 to move toward the acting portion 5a side while being guided by the slide pins 4, whereby a reaction force nail 5e presses the reacting-portion-5b-side friction pad 6 against the

other side surface of the disc rotor 2. During that course, the ears 12a of each friction pad 6 are moved smoothly inside the respective pad guide grooves 3c while the outer (in the disc radial direction) side faces 12b and the inner side faces 12c are guided by the outer receiving pieces 20g and the inner receiving pieces 20f of the retainer portions 20a, respectively, and the end faces 12d of the ears 12a press the pad springing-back portions 20j against the side pieces 20h, respectively.

On the other hand, when the above braking manipulation is canceled, the pistons 8 and the reaction force nail 5e are retreated to their positions where they were located before the start of the braking. In returning to their original shapes, the elastic loop portions 20i and the pad springing-back portions 20j push the ears 12a that are in contact with the pad springing-back portions 20j away from the disc rotor 2, whereby each friction pad 6 is forcibly separated from the side surface of the disc rotor 2. As a result, dragging of each friction pad 6 can be prevented and juddering that is caused by wear of the disc rotor 2 and brake noise can be suppressed or reduced effectively.

As the lining 13 of each friction pad 6 is worn, the friction pad 6 gradually advances toward the disc rotor 2 and the ears 12a come to contact portions of the pad spring-back portions 20j that are closer to their tips, that is, more distant from the elastic loop portions 20i. Although the spring force

from each elastic loop portion 20i decreases, increase in the force from the pad spring-back portion 20i can compensate for that decrease because the pad spring-back portion 20i is warped. Each friction pad 6 can reliably be separated from the side surface of the disc rotor 2 irrespective of the wear state of the lining 13.

A second embodiment of the present invention will be hereinafter described in detail with reference to the drawings. Figs. 9-15 shows a second embodiment in which the invention is applied to a pin-slide-type disc brake. A disc brake 31 is composed of a disc rotor 32 that is to rotate together with a wheel, a caliper bracket 33 to be fixed to a vehicle body on one side of the disc rotor 32, a caliper body 35 that is supported by two caliper support arms 33a of the caliper bracket 33 via a pair of slide pins 34 so as to be movable in the disc axis direction, and a pair of friction pads 36 that are located inside an acting portion 35a and a reacting portion 35b of the caliper body 35 so as to be opposed to each other with the disc rotor 32 interposed in between.

The caliper body 35 is composed of the above-mentioned acting portion 35a and reacting portion 35b that are disposed on both sides of the disc rotor 32 and a bridge 35c that strides the outer periphery of the disc rotor 32 and connects the acting portion 35a and the reacting portion 35b. Two cylinder holes 37 are formed in the acting portion 35a so as to be opened on

the disc rotor 32 side. A piston 38 that is shaped like a closed-end cylinder is housed in each cylinder hole 37, and each piston 38 is moved inside the cylinder hole 37 toward the disc rotor 32 by a pressurized fluid that is supplied to a fluid pressure room 39 that is formed at the bottom of the cylinder hole 37. Two vehicle body attachment arms 35d project sideways from the acting portion 35a, and the above-mentioned slide pins 34 are attached, by means of attachment bolts 40, to the tip portions of the vehicle body attachment arms 35d so as to project from the vehicle body attachment arms 35d, respectively.

The caliper support arms 33a are shaped so as to originate from positions on both sides of the caliper bracket 33, bridge the outer periphery of the disc rotor 32 in the disc axial direction with the bridge 35c interposed in between, and extend toward the disc center parallel with the side wall of the reacting portion 35b on the other side of the disc rotor 32. The tip portions of the caliper support arms 33a are connected to each other by a tie rod 33b to increase the rigidity of the support arms 33a on which braking torque is exerted.

A guide hole 41 that houses the above-mentioned slide pin 34 is formed in each caliper support arm 33a, and a total of four pad guide grooves 33d are formed in the caliper support arms 33a on both sides of the disc rotor 32 so as to be opposed to each other. Each pad guide groove 33d has a bracket shape having an outer (in the disc radial direction) side face 33e,

an inner side face 33f, and an opposed face 33g that connects the outer face 33e and the inner face 33f. Two ears 42a projecting from both side portions of a back plate 42 of each friction pad 36 are movably supported by two (i.e., disc-entrance-side and disc-exit side) pad guide grooves 33d via pad retainers 50, respectively.

Each of the disc-entrance-side and disc-exit-side pad retainers 50 is composed of a pair of retainer portions 50a that are set in the pad guide grooves 33d located on both sides the disc rotor 32, two elastic loop portions 50b and pad springing-back portions 50c that are continuous with the respective retainer portions 50a, a link 50d that strides the outer periphery of the disc rotor 32 and connects the tops of the retainer portions 50a, and an attachment piece 50e that is locked with a rotor groove 33h of the caliper support arm 33a. Each retainer portion 50a is composed of an inner receiving piece 50f and an outer receiving piece 50g that are opposed to each other in a direction that is somewhat inclined from the disc radial direction with the ear 42a of the friction pad 36 interposed in between, and a side piece 50h that connects the pieces 50f and 50g.

Each inner receiving piece 50f is connected to the pad springing-back portion 50c via the circular-arc-shaped elastic loop portion 50b that is located outside the inner receiving piece 50f in the disc axial direction. Each elastic loop portion 50b is formed by bending back, toward the disc rotor 32 in circular



arc form, a long and narrow piece extending from the inner receiving piece 50f horizontally away from the disc rotor 32. The long and narrow piece further extends from the elastic loop portion 50b toward the disc rotor 32 to form the pad springing-back portion 50c.

Each pad springing-back portion 50c is longer than a distance by which the ear 42a of the friction pad 36 is moved from a time when the lining 43 is new to a time when it is fully worn. And each pad springing-back portion 50c is inclined, that is, warped, so as to go away gradually from the inner receiving piece 50f as it extends toward the disc rotor 32. To facilitate insertion of the ear 42a of the friction pad 36, insertion guides 50i are bent outward from each outer receiving piece 50g and each side piece 50h on the side opposite to the disc rotor 32.

The pad retainer 50 having the above structure is set in such a manner that the inner receiving piece 50f and the outer receiving piece 50g of each retainer portion 50a are brought in contact with the inner (in the disc radial direction) side face 33f and the outer side face 33e of the pad guide groove 33d, respectively, and the side piece 50h is placed on the opposed face 33g of the pad guide groove 33d. As a result, each elastic loop portion 50b is disposed adjacent to the caliper support arm 33a on the side opposite to the disc rotor 32, and each pad springing-back portion 50c is disposed closer to the disc rotor 32 than the elastic loop portion 50b is and is inclined, i.e.,

warped, so as to gradually come closer to the outer (in the disc radial direction) side face 33e of the pad guide groove 33d as it extends toward the disc rotor 32.

As for each friction pad 36, the ears 42a of the back plate 42 are inserted in the disc-entrance-side and disc-exit-side pad guide grooves 33d, respectively, the outer (in the disc radial direction) side faces 42c of the ears 42a are brought in contact with the outer receiving pieces 50g of the retainer portions 50a, respectively, and the inner (in the disc radial direction) side faces 42b of the ears 42a are brought in contact with the pad spring-back portions 50c, respectively. With the friction pads 36 thus attached, the elastic loop portions 50b are located on the opposite sides of the ears 42a to the disc rotor 32.

In this embodiment having the above configuration, when a pressurized operating fluid is supplied to the fluid pressure rooms 39 in response to a braking manipulation of the driver, the pistons 38 advance in the cylinder holes 37 and press the acting-portion-35a-side friction pad 36 against the one side surface of the disc rotor 32 that is rotating in the direction A. Resulting reaction force causes the caliper body 35 to move toward the acting portion 35a side while being guided by the slide pins 34, whereby a reaction force nail 35e presses the reacting-portion-35b-side friction pad 36 against the other side surface of the disc rotor 32.

During that course, the ears 42a of each friction pad 36 are moved smoothly inside the respective pad guide grooves 33d while the outer (in the disc radial direction) side faces 42c of the ears 42a are guided by the outer receiving pieces 50g of the retainer portions 50a, respectively, and the inner (in the disc radial direction) side faces 42b press the pad springing-back portions 50c against the inner receiving pieces 50f, respectively. While the pad springing-back portions 50c are pressed against the inner receiving pieces 50f by the ears 42a, the spring force of the elastic loop portion 50b and the pad springing-back portions 50c pushes the inner side faces 42b of the ears 42a toward the outer (in the disc radial direction) side faces 33e of the pad guide grooves 33d.

As a result, the outer (in the disc radial direction) side faces 42c of the ears 42a are always pressed against the outer (in the disc radial direction) side faces 33e of the pad guide grooves 33d. Therefore, the ears 42a do not play inside the pad guide grooves 33d during the braking, whereby generation of a friction pad striking sound due to play of the ears 42a can be prevented and brake noise can be reduced effectively.

On the other hand, when the above braking manipulation is canceled, the pistons 38 and the reaction force nail 35e are retreated to their original positions where they were located before the start of the braking. In returning to their original shapes, the elastic loop portions 50b and the pad springing-back

portions 50c push the ears 42a that are in contact with the pad springing-back portions 50c away from the disc rotor 32, whereby each friction pad 36 is forcibly separated from the side surface of the disc rotor 32. As a result, dragging of each friction  
5 pad 36 can be prevented and juddering that is caused by wear of the disc rotor 32 and brake noise can be suppressed or reduced effectively.

As the lining 43 of each friction pad 36 is worn, the friction pad 36 gradually advances toward the disc rotor 32 and  
10 the ears 42a come to contact portions of the pad spring-back portions 50c that are closer to their tips. Although the spring force from each elastic loop portion 50b decreases, increase in the force from the pad spring-back portion 50c can compensate for that decrease because the pad spring-back portion 50c is  
15 warped. Each friction pad 36 can reliably be separated from the side surface of the disc rotor 32 and play of each friction pad 36 can be prevented irrespective of the wear state of the lining 43.

When each friction pad 36 is tentatively attached to  
20 the caliper support arms 33a of the caliper bracket 33, the elastic loop portions 50b are located on the opposite sides of the ears 42a to the disc rotor 32. Therefore, even if the ears 42a are pushed away from the disc rotor 32, the elastic loop portions 50b contact the ends, opposite to the disc rotor 32, of the ears  
25 42a and hence can prevent falling-off of the friction pad 36.

The ease of attachment of each friction pad 36 can thus be increased.

The invention is not limited to the case of using the pad retainer of the above embodiment. As long as the pad retainer  
5 has the receiving pieces to contact the inner (in the disc radial direction) side faces of the pad guide grooves, the elastic loop portions, and the pad springing-back portions, the other portions such as the link and the attachment piece may have any shapes.

Next, the second embodiment of the invention will be  
10 described with reference to Figs. 9 and 11 in detail. In a pad retainer 41 according to this embodiment, the inner receiving piece 50f of each retainer portion 50a is formed with a pad falling-off preventive portion 50b having a springing-back function and a pad springing-back portion 50c that are continuous  
15 with each other. The pad falling-off preventive portion 50b and the pad springing-back portion 50c constitute a pad returning portion (i.e., a pad returning mechanism of the invention).

Each retainer portion 50a has an inner receiving piece 50f, an outer receiving piece 50g that is opposed to the inner  
20 receiving piece 50f, and a side piece 50h that connects the inner receiving piece 50f and the outer receiving piece 50g. The tops of the two retainer portions 50a are connected to each other by a link 50d. The link 50d is formed with an attachment piece 50e that is locked with the rotor groove 33h of the caliper support  
25 arm 33a. Each outer receiving piece 50g and each side piece 50h

are formed with insertion guides 50i, respectively.

5 A long and narrow piece extending from each inner receiving piece 50f horizontally away from the disc rotor 32 is bent back toward the disc rotor 32 so as to assume a circular arc to form the loop-shaped pad falling-off preventive portion 50b having a spring force. The long and narrow piece further extends from the pad falling-off preventive portion 50b toward the disc rotor 32 to form the pad springing-back portion 50c. Each pad springing-back portion 50c is longer than a distance 10 by which the ear 42a of the friction pad 36 is moved from a time when the lining 43 is new to a time when it is fully worn. And each pad springing-back portion 50c is inclined, that is, warped, so as to go away gradually from the inner receiving piece 50f as it extends toward the disc rotor 32.

15 The pad retainer 41 having the above structure is set in such a manner that the inner receiving piece 50f and the outer receiving piece 50g of each retainer portion 50a are brought in contact with the inner (in the disc radial direction) side face 33f and the outer side face 33d of the pad guide groove 20 33c, respectively, and the side piece 50h is placed on the opposed face 33f of the pad guide groove 33c. As for each friction pad 36, the ears 42a of the back plate 42a are inserted in the pad guide grooves 33c, respectively, the outer (in the disc radial direction) side faces 42b of the ears 42a are brought in contact 25 with the outer receiving pieces 50g of the retainer portions

50a, respectively, and the inner (in the disc radial direction) side faces 42c of the ears 42a are brought in contact with the pad spring-back portions 50c, respectively. With the friction pads 36 thus attached, the pad falling-off preventive portions 50b are located on the opposite sides of the ears 42a to the disc rotor 32.

In this embodiment, during braking, the ears 42a of each friction pad 36 are moved smoothly inside the respective pad guide grooves 33c while the outer (in the disc radial direction) side faces 42b of the ears 42a are guided by the outer receiving pieces 50g of the retainer portions 50a, respectively, and the inner (in the disc radial direction) side faces 42c press the pad springing-back portions 50c against the inner receiving pieces 50f, respectively. The pad springing-back portions 50c push the inner side faces 42c of the ears 42a toward the outer (in the disc radial direction) side faces 33d of the pad guide grooves 33c and thereby always press the outer (in the disc radial direction) side faces 42b of the ears 42a against the outer (in the disc radial direction) side faces 33d of the pad guide grooves 33c.

On the other hand, when the above braking is canceled, in returning to their original shapes, the pad falling-off preventive portions 50b and the pad springing-back portions 50c push the ears 42a that are in contact with the pad springing-back portions 50c away from the disc rotor 32, whereby each friction

pad 36 is forcibly separated from the side surface of the disc rotor 32. As in the case of the first embodiment, even if the lining 43 of each friction pad 36 is worn, resulting reduction in spring force can be compensated for by increase in the force  
5 from the pad springing-back portions 50c because they are warped.

In this embodiment, the falling-off preventive portions 50b also have the function of the falling-off preventive portions 40c of the first embodiment. Therefore, the ease of attachment of each friction pad 36 can be increased inexpensively without  
10 increasing the number of parts.

The invention is not limited to the above embodiments. The pad falling-off preventive portions according to the invention may be combined with an existing pad retainer. The shape of each pad falling-off preventive portion is not limited  
15 to the loop shape and may have any shape. Further, although in the above embodiments the pad returning portions as the pad returning mechanisms of the invention are integral with the pad retainer, the pad returning mechanisms may be known mechanisms that are separated from the pad retainer.

20 As described above, according to the disc brake for the vehicle of the invention, the friction pads can be prevented from falling off the caliper bracket in attaching the friction pads to the caliper bracket tentatively. Therefore, the attachment work does not require much time and the manufacturing  
25 cost can be reduced accordingly.



As described above, according to the invention, the pad springing-back portions formed in the pad retainers are solely able to not only return the friction pads but also effectively prevent play of the ears to thereby reduce brake noise and suppress juddering caused by wear of the disc rotor and effectively prevent generation of a friction pad striking sound due to play of the ears.

Dragging of the friction pads and play of the ears can be prevented reliably from a time when the friction pads are new to a time when they are fully worn. Further, the friction pads can be prevented from falling off the caliper bracket in attaching the friction pads to the caliper bracket tentatively, and hence the attachment work does not require much time.